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CONTENTS

Rationalization and Monopoly
—With Reference to the Concentration of Economic Power, in Particular to the Industrial Combination—
.... KENJI MESAKI 1

A Suggestion for Revival of Wage Fund Theory .... SHOZO SOBAJIMA 17

An Analytical Study of the Enterprise Growth .... KAORU TAKADA 27

~~Business Budgetary Control in Japan ...... BOKURYO NAGAHAMA 39~~

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RATIONALIZATION AND MONOPOLY

—With Reference to the Concentration of Economic Power, in Particular to the Industrial Combination—

KENJI MESAKI

This treatise is to follow my "Rationalization and Monopoly" in "Osaka Economic Papers", Vol. IV, No. 3, 1956, and actually makes up the third section of the said article.

Rationalization and monopoly are of quite different concepts. Rationalization is, so far as I understand, an all-round arrangement to lower the cost of production or selling, in particular, by the mechanization of plants or facilities. Monopoly means a control of market which aims at enhancing or maintaining the price level of commodities. On the other hand, with respect to rationalization and, in particular, to monopoly, the concentration of economic power is sometimes referred to as being corelated with them. However, the concentration of economic power is to be distinguished from rationalization or monopoly, at least so far as the concepts of these functions or organizations are concerned. It signifies the accumulation of capital or the operation of enterprises in the hand of one party, upon which business activities give birth to the intensification of their strength. It appears as the enlargement of establishments or of business size, or as an industrial combination,—the latter being represented either by the temporary agreement of the entrepreneurs concerned or by the consolidation of capital invested.

Thus the concentration of economic power being a special form of economic organization, should be considered distinctly from the effect which may be brought about by itself. Of course, any economic organization, so far as the individual entrepreneur's action is concerned, develops according to his aims at maximizing or attaining profit. In other words the concentration of economic power is subject to the entrepreneur's objective, and can be looked upon as a method of realizing profit. On the other hand, the processes or ways to achieve the said objective are another thing and require separate investigation. We can consider these processes from two viewpoints—increasing the revenue and lowering the cost. This does not neglect the general thesis for maximizing profit—marginal revenue being equal to marginal cost. Thus, having in mind the objective of making profit, the processes for it (the increasing of revenue and the lowering of cost) on the one hand, and the means to realize profit (the concentration of economic power) on the other hand, have to be combined so as to form particular types of economic arrangement.

As mentioned above, the concentration of economic power underlies either the consolidation or accumulation of capital, or the temporary agreement of the entrepreneurs concerned. The enlargement of establishments and the amalgamation of corporations belong to the former. We can call these structures the consolidation type. The trust is of this type, for it is such a kind of the consolidation of capital which aims at monopoly (increasing revenue). On the other hand, the trade association belongs, as a whole, to the latter. We can designate this latter structure, a temporary agreement of the entrepreneurs concerned, as the agreement type. Cartels are of this type, because they are associations of firms which aim at monopoly. "Interessengemeinschaft" popular in German industries, a trade agreement for the pooling of the profit and loss of member firms, can be included also in this type. This agreement consists in submitting some incidences of ownership to one party and consequently in placing its members' activities to that extent under the same control. "Interessengemeinschaft" had been formed also sometimes for achieving monopoly, and at other times for realizing rationalization.

Besides these two types of concentration of economic power, we can observe another type. This is an intermediate or mixed type of the said two, that is, to some extent having the features of consolidation, while at the same time involving some characteristics of the agreement type. We can designate this as an intermediate type of concentration of economic power. The intermediate type is represented by industrial combines which are called "Konzerne" and avail much in German business circles. In the "Konzern" two or more firms place whole or some parts of their operations under the same control. This control is secured through the holding of some of the share-stocks of the corporations concerned by mother companies, the interlocking of directorates, hiring or managing as trustee other firm's plants, licensing patents, etc. In concluding, we can demarcate three types of concentration of economic power—the consolidation, agreement and intermediate types.

Next let us examine the processes of profit-making, with reference to the concentration of economic power. We have already mentioned to some extent some of the forms of industrial combination as related to the processes of profit-making,—the trust, cartel and "Interessengemeinschaft". Now we will proceed more generally to investigate these processes, and then to the particular types of concentration of economic power from this viewpoint. Profit is the result of revenue minus cost. Therefore, for increasing profit it is required either to increase revenue, to reduce cost, or to do both. And, for increasing revenue it is advisable either to raise prices or to expand sales. Monopoly is generally used for raising prices, while advertising and selling services are effective for expanding sales. Moreover, advertising and selling services are available at the monopolized market. As regards reducing cost, this is involved in the function of rationalization[1]. In short, profit-increasing can be attained by means of monopoly and rationalization.

The maximization of profit takes place when the amount of production or sales equalizes marginal revenue and marginal cost. In this case, the revenue function and the cost function or curve are considered as given. Therefore, if one or both of these functions change, the maximized amount of profit will also change. And, the revenue function can be modified by the monopoly of market, while the cost curve is reshaped or shifts according to the rationalized process of production or selling. In this sense, the maximization of profit is conditioned by either monopoly or rationalization.

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[1] Cf. Kenji Mesaki, Rationalization and Monopoly, *Osaka Economic Papers*, Vol. IV, No. 3, 1956.

For the time being, we will treat independently two phases of the process for achieving profit—increasing revenue and reducing cost. This treatment might be subject to some objection, because the functions of revenue and of cost are actually as well as theoretically interrelated. The function of revenue or sales is related to the demand curve, while that of cost is the supply curve. Each one of these two functions is connected to the other through the medium of amount of production. When a supply curve and a demand curve are given, production and selling are planned to proceed at such an amount that realizes maximum profit. There probably remains no problem of treating each of these curves independently. Again, as Mrs. Robinson pointed out, the concept that the supply curve and the demand curve exist independently of each other does not suit the actual case[1]. Suppose, for instance, a firm spends some amount of money for advertising, or gives credit to the consumers of goods. The cost of advertising will change the cost curve, but may increase the amount of sales, thus shifting the supply and demand curves. We can also indicate a reversal. A patent in production in a plant may realize the monopolization of a product and increase revenue. At the same time, a change of the cost curve, for instance, involving the license fee of the patent or the rise of wages necessitated in that individual firm, might be accompanied by the shift of the supply curve.

The assumption that the demand curve is independent of the cost curve or supply curve is adopted for the sake of facilitating a theoretical analysis of equilibrium, in particular, of free competition. It is also required by the same reason to assume that the cost or supply curve is independent of the demand curve. Although these assumptions are to some extent unrealistic, still we want to treat the demand curve independently of the supply curve (also the supply curve independently of the demand curve). Consequently we have to, for the time being, neglect the co-relation between monopoly and rationalization. Let us see in the following, the reason why this sort of analysis is adopted.

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[1] Robinson J., Economics of Imperfect Competition, P. 94.

1) In free competition, the cost or supply curve of the individual firm does not affect the price of commodities which this firm produces. Also, the amount of products will be sold up at a given price. Furthermore, because there appears, in fact, no monopoly in this case, rationalization has nothing to do with monopoly. We can point out a special example of the above feature. In the field of small and medium-sized businesses, generally, the monopolization of products does not often take place. On the other hand, they more or less rationalize their operations. This is due to the fact that the number of small and medium-sized firms is so large that each of them is infinitesimally small compared with their aggregates. In other words, even if we grant that these firms aim at a monopoly of the market, whether as a result of rationalizing of their production or of their efforts to reduce cost by larger scale production, they would not be successful in realizing their purpose. This feature may remain prevailing even if the said monopoly or rationalization is undertaken by large buriness or through any other form of concentration of economic power. In short, rationalization will be introduced in both small and large establishments. But they may not succeed in controling their market.

We can draw the following conclusion from the above statement. The rationalization of production, whether it is accompanied by the concentration of economic power or not, may not relate to monopoly, if the proceedings of the former are confined to the individual firm concerned and its effect has no direct contact with the majority of enterprises engaged in business in the same branch as that firm. This characteristic can be applied not only to small and medium-sized businesses, but also to large firms.

2) We can assume the case that, while the cost curve changes by rationalization, the demand curve remains constant. In this case, if the amount of sales is constant under a given price of the commodity, the maximization of the profit rate will be attained by the minimization of the average cost which meets the aim of rationalization. And, the minimization of the average cost of the said sales amount might

be secured without regard to monopolization of the commodity to be sold. In any case, rationalization and monopoly may take place independently of each other.

3) There might be such a case that, while the demand curve shifts or changes its shape because of an increase of demand, the cost curve remains the same as before. Here, if the amount of cost is constant, the maximization of profit and its rate will be achieved by the maximization of the price of commodities to be sold. This is involved in the function of monopoly. Therefore, monopoly can prevail without regard to the cost curve.
4) As mass production proceeds with the mechanization of plants, firms might face such difficulty that the more they intend to reduce cost, the more they are required to produce and to sell. This apparently looks as though it brings about rationalization accompanied by monopoly. However, the firms, at a given size of the plant, and at a given price of the commodity, may operate their production at such a scale that maintains the minimum average cost of production. On the other hand, the management endeavours to sell up as much as possible the amount of products, by means of advertising and other selling facilities. Therefore, the cost curve will be of such a shape as to bring about fair profit (the price including just average cost plus fair profit). In short, the cost curve will change and the demand curve which is horizontal will extend its length. However, the firm, while it reduces cost by rationalization, does not necessarily intend to monopolize the marketing of its commodity.

So far we have analysed the relation between the cost or supply curve and the demand function, and also have dealt with rationalization with respect to monopoly. What we have observed is as follows : Though the cost or supply curve and the demand curve (whether they exist or not independently of each other) are related intimately to rationalization and monopoly respectively, the relation between the former functions does not coincide with that between the latter operations. Furthermore, the relation between rationalization and monopoly can be oriented only in the situation where either monopoly exists or is stimulated to exist by rationalization, or where rationalization is affected by monopoly.

Now let us go on to see, as to what the ways of making profit are, the reducing of cost or rationalization and the increasing of revenue or monopoly with respect to the concentration of economic power or industrial combination. For the sake of rationalization, that is, of reducing cost, some cooperative associations have been founded in various countries. In Japan an industrial association "Kogyokumiai" developed before the armistice of the second Great War. For instance it had such property as machines, warehouses, selling shops, etc., which its members used individually or in common by mutual agreement. On the other hand, cartels and trusts are forms of concentration of economic power or industrial combination which aim at monopoly. Thus, two types of concentration of economic power can be observed from the viewpoint of the ways for profit-making.

However, there is one more way of profit-making. Enterprises as going concerns intend to maintain their existences for the future, and make a plan to continue a certain profit-rate for a long period. On the other hand, they have to operate under the fluctuation of the economic situation. Recently observation technology and prophecy analyses have developed to such an extent that expectation often coincides with realized fact. But they are not yet so successful as to be introduced to a great extent in business operations, in particular for a long period. Accordingly, the management makes various devices to avoid the risk which would be incurred on the investment. One of these devices is to distribute the investment of a given amount of capital among as many different fields of trade and industry as possible. That is, it aims at minimizing the risk on the investment by balancing large profit in some fields and small profit or loss in others, which may be brought about by future operations of the enterprise.

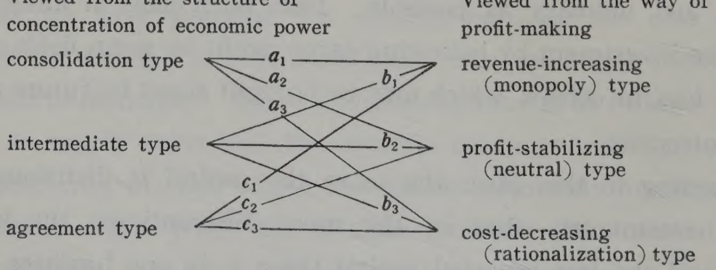
According to this idea, the more the capital is distributed among various investments,—that is, the more differentiated the investment sector is and the less invested capital there is in one business,—the less the risk of loss on the investment of total capital will be. Therefore, it may insure the maintenance of an expected profit rate for a long period.

Moreover, when the field or sector to which capital is invested increases, the field or sector, the investment in which has high probability of realizing a certain profit-rate, also increases. Consequently, entrepreneurs can have chances to find more sound fields for their investments.

The third way of profit-making is quite different from the ways of increasing revenue and reducing cost. It has nothing to do directly with either the marketing of commodities or the cost of production. Therefore, we may call this third way, a neutral way of profit-making. The distribution of capital-investment among different fields is in a sense a fundamental arrangement upon which businesses operate to make profit. It is a priori consideration for the business administration. Underlying this consideration, production and marketing are carried on. In this sense the proper distribution of capital-investment can be considered as aiming at the optimization of the higher level of the enterprise.

Thus, as far as the way of profit-making is concerned, we can designate three different ways—increasing revenue (monopoly), reducing cost (rationalization) and stabilizing the profit rate (neutral). Consequently, in this point of view, there appear in existence three types of concentration of economic power. Then, if we consider the types coming from the structure of concentration of economic power, three other types as mentioned before will be added here. In this way we may grasp very clearly the various forms of concentration of economic power, in particular those of industrial combination. The following graph will perhaps serve sufficiently to explain this feature.

Types and Forms of Concentration of Economic Power, in particular Those of Industrial Combination.


Viewed from the structure of concentration of economic power
Viewed from the way of profit-making
consolidation type
intermediate type
agreement type
revenue-increasing (monopoly) type
profit-stabilizing (neutral) type
cost-decreasing (rationalization) type
a_1
a_2
a_3
b_1
b_2
b_3
c_1
c_2
c_3

a_1=trust, a_2=circular combination, a_3=
b_1=trust, b_2=circular combination, b_3=
c_1=cartel, c_2=Interessengemeinschaft, c_3=cooperative trade association.

In the graph, a_3 and b_3, both of which are related to rationalization, are lacking in particular names. This does not mean that the forms of the concentration of economic power which match the features indicated by those symbols do not exist. On the contrary, they have actually developed to such an extent that they are very popular in business circles, but they have not yet been provided with specific terminology. However, we have to take into account the reason why specified names are lacking for these particular forms of industrial combination. It involves more important problems beyond simple terminology. To the symbols, a_1, b_1, c_1, etc. trust, cartel and so forth, well-known terms can be assigned respectively. Trusts and cartels have been always criticized in almost every country with respect to their effect, in particular to their bad influence upon the national economy. These facts indicate that any type of concentration of economic power relating to cost-reducing (rationalization) has not drawn so much attention of the people concerned as that of revenue-increasing (monopoly). A business man may remain undisturbed without bothering himself about the terminology of any institution, if it has merit for the operation of the individual concern.

Before proceeding to the last paragraph of this treatise, let us re-examine the relation between profit-making (revenue-increasing or monopoly and cost-reducing or rationalization) and the concentration of economic power. As a matter of fact, we seem to have recognized a priori that the concentration of economic power serves directly to promote monopoly or rationalization. Therefore it will be necessary to explain more precisely this relation. As regards the fact that the concentration of economic power plays a big role in bringing about monopoly, it probably may not need any further treatment. Both the concentration of economic power and monopoly involve a common element of control of the businesses concerned. On the other hand, with respect to rationalization through the concentration of economic power, it will be worthwhile to re-examine it more thoroughly.

When we start a new plant, or consider as a whole the reduction of cost with respect to the scale of production, we will, generally speaking, prefer a large scale to a small one. Of course this preference is subject to the field of industry and the process of production, even if the market of commodities is large enough and the capital needed is sufficiently supplied for the election and operation of the establishment. This sort of thinking is based upon the effect of capital-accumulation on the production—capital-accumulation being a phase of concentration of economic power. It is well known as such an analysis used in the comparison between the large and small sizes of business. Therefore it will be far more useful here to deal with the concentration of economic power as such a feature that existing firms or establishments come under one and the same control.

When we treat here the concentration of economic power as defined above, we can see its various effects on the cost of production. For example, production may be concentrated in the most efficient plant or may be arranged in such a way as to be operated at the establishments nearest to the markets. Sometimes it might bring about more mechanization of the process. The managemet will plan to concentrate the buying of materials and the selling of products in one or a few departments. These procedures will surely reduce the cost, and are a sort of rationalization. How do things apear then, where there is no such rearrangement of operation? Generally speaking, the concentration of economic power, whether it accompanies a reformation of production or not, enforces the financial situation of business, which in turn contributes directly or indirectly to the reduction of cost. When many firms are united into one bigger company, the number of directors of managers may be decreased, so as to reduce the overhead cost of production. However, apart from these, does the concentration of economic power have another aspect of cost-reducing, due to operating several establishments or firms under the same control? On the other hand, the large scale of business has the unfavourable feature of increasing overhead cost such as watchmen's wages, and accounting and managerial expenses.

Now we want to generalize the relation between the concentration of economic power (operation of many firms and establishments under the same control) and the cost of production.

equation of cost ··· $C = A + V(x)$.

$A =$ constant cost. $V(x) =$ variable cost. $x =$ amount of production.

$A > 0$, $V(x) > 0$.

We shall compare the cost when operations are carried on under the same control and that before this incidence has not taken place. For the sake of a simplified interpretation, let us assume that the form of cost function is the same before and after the concentration of production appears.

1) Equation of cost function before the concentration of production, (that is, costs of many establishments concerned as independent units are summed up,)

$$\sum_{i=1}^{n} C_i = \sum_{i=1}^{n} \{A_i + V(x_i)\}\,. \qquad (1)$$

$i = 1, 2, 3, \cdots\cdots, n,$

= denoting the number of each establishment to be included under the same control.

2) Equation of cost function after the concentration of production,

$$C_0 = A_0 + V(x_0)\,, \quad x_0 = \sum_{i=1}^{n} x_i\,. \qquad (2)$$

If $A_0 + V(x_0) < \sum_{i=1}^{n} \{A_i + V(x_i)\}$, following cases may be considered.

(a) $A_0 < \sum_{i=1}^{n} A_i\,, \quad V(x_0) = \sum_{i=1}^{n} V(x_i)\,.$

(b) $A_0 = \sum_{i=1}^{n} A_i\,, \quad V(x_0) < \sum_{i=1}^{n} V(x_i)\,.$

(c) $A_0 < \sum_{i=1}^{n} A_i\,, \quad V(x_0) < \sum_{i=1}^{n} V(x_i)\,.$

(d) $A_0 > \sum_{i=1}^{n} A_i\,, \quad V(x_0) < \sum_{i=1}^{n} V(x_i)\,,$

here, the condition for $C_0 < \sum_{i=1}^{n} C_i$ is,

$$A_0 - \sum_{i=1}^{n} A_i < \sum_{i=1}^{n} V(x_i) - V(x_0)\,.$$

(e) $A_0 < \sum_{i=1}^{n} A_i\,, \quad V(x_0) > \sum_{i=1}^{n} V(x_i)\,,$

here, the condition for $C_0 < \sum_{i=1}^{n} C_i$ is,

$$\sum_{i=1}^{n} A_i - A_0 > V(x_0) - \sum_{i=1}^{n} V(x_i)\,.$$

Among these five cases, (e) can be probably thrown aside, because it does not suit the actual instance, or would be not practically of much importance.

Now then,

a) $A_0 < \sum_{i=1}^{n} A_i$, $V(x_0) = \sum_{i=1}^{n} V(x_i)$.

In this case, the form of cost function will be

$$C = ax + A,$$

and will be adaptable, for instance, in a case where the number of senior officers is reduced by managing many establishments under the same control.

b) $A_0 = \sum_{i=1}^{n} A_i$, $V(x_0) < \sum_{i=1}^{n} V(x_i)$.

c) $A_0 < \sum_{i=1}^{n} A_i$, $V(x_0) < \sum_{i=1}^{n} V(x_i)$.

d) $A_0 > \sum_{i=1}^{n} A_i$, $V(x_0) < \sum_{i=1}^{n} V(x_i)$.

A, constant cost, may remain the same or be changed after concentrating whole production. However it has no connection with x, the amount of production, within a certain sphere of its amount; and is invariable. Therefore, including both (b), (c) and (d), it will be sufficient to find the form of $V(x)$ of the case,

$$V(x_0) < \sum_{i=1}^{n} V(x_i).$$

We have assumed $V(x) > 0$. If the rate of increase of $V(x)$ decreases with the increase of x,

$$V(x_1 + x_2) < V(x_1) + V(x_2).$$

If the rate of increase of $V(x)$ increases with the increase of x,

$$V(x_1 + x_2) > V(x_1) + V(x_2).$$

More generally speaking,

$$x > 0,$$

$$\text{If} \begin{cases} V(x) > 0 \qquad (V(0) = 0) \\ V'(x) > 0 \\ V''(x) < 0, \end{cases}$$

then, $V(x_0) < \sum_{i=1}^{n} V(x_i)$.

$$\text{If} \begin{cases} V(x) > 0 & (V(0) = 0) \\ V'(x) > 0 & \\ V''(x) > 0, & \end{cases}$$

then, $V(x_0) > \sum_{i=1}^{n} V(x_i)$.

In conclusion, the sign of $V''(x)$, negative or positive, will suggest an answer to the question how the cases (b), (c) and (d) take place. In other words, the concentration of production will bring about a lower variable cost, if the cost function is of such a form that marginal cost decreases.

The above interpretation indicates that as far as variable cost is concerned, where the law of diminishing cost prevails, the cost of production reduces by the management of whole establishments under the same control. However, in the above cases, it has been assumed that A, that is, constant cost, remains the same or changes its amount. Another assumption is that the form of cost function and the amount of whole products are left unchanged after concentrating production. Upon these assumptions variable cost will be decreased. Then, how can it be achieved? So far as the form of cost function remains unchanged and the amount of constant cost is the same as before, it means that there is no reform of productive or marketing process, in particular with respect to the mechanization of plants, shops and other facilities, because the reform of productive or marketing process generally accompanies the increase of capital. The decrease of cost occurs in such an instance that the cost of materials will be reduced, through the means of coordinating purchasing agencies. Another instance is that the sales of commodities through common management lowers the cost of selling. These cases are not necessarily to be related to monopoly on the side of producers.

We have assumed in the above analysis that the form of cost function and the total amount of products remain the same before and after the reorganization. However, this assumption can be thrown away. Here it would be better, if we deal with (d) case, that is,

$$A_0 > \sum_{i=1}^{n} A_i, \quad V(x_0) < \sum_{i=1}^{n} V(x_i),$$

but the form of $V(x)$ changes and x_0 is not equal to $\sum_{i=1}^{n} x_i$. This means that by increasing capital, or introducing more mechanization and improved processes, more mass or specialized production is carried out and reduced cost is brought about. It indicates a general aspect of rationalization with respect to the concentration of economic power.

As mentioned above, it is obvious that concentrating production on fewer establishments might lead sometimes to the monopolization of market. However, it may not be unuseful to add some explanation of this feature from the viewpoint of cost analysis as stated above.

Here again, the equation of cost is $C=A+V(x)$, and we assume that the form of cost function remains unchanged after the concentration of production. Equation (1) and (2) are applicable in this case. However, we want to modify somewhat the analysis as stated before. That is to assume

$$C_0=\sum_{i=1}^{n} C_i, \quad x_0=\sum_{i=1}^{n} x_i .$$

This means that the average cost of production remains unchanged after the reorganization. Generally, if $A_0+V(x_0)=\sum_{i=1}^{n}\{A_i+V(x_i)\}$, the following cases may be considered.

a) $A_0<\sum_{i=1}^{n} A_i, \quad V(x_0)>\sum_{i=1}^{n} V(x_i),$

here, the condition for $C_0=\sum_{i=1}^{n} C_i$ is,

$$\sum_{i=1}^{n} A_i-A_0 = V(x_0)-\sum_{i=1}^{n} V(x_i) .$$

b) $A_0=\sum_{i=1}^{n} A_i, \quad V(x_0)=\sum_{i=1}^{n} V(x_i) .$

c) $A_0>\sum_{i=1}^{n} A_i, \quad V(x_0)<\sum_{i=1}^{n} V(x_i),$

here, the condition for $C_0=\sum_{i=1}^{n} C_i$ is,

$$A_0-\sum_{i=1}^{n} A_i = \sum_{i=1}^{n} V(x_i)-V(x_0) .$$

Among these three cases, (a) and (c) perhaps will be actually of no importance for the present investigation. On the other hand (b) means that the status of production after putting whole production under common management is just the same as before. No rationalization takes place. At the same time it may suggest the end of competition which existed among the firms consisting of this new organization. Therefore, it may lead to monopoly, sometimes to raising the price of the commodities concerned. For, cost remaining the same, the concentration of production can find reason for its existence only in increasing revenue, in particular, by enhancing the prince of the commodity.

So far, I have explained that the behavior of the entrepreneur is to make more profit either by the monoply of products or by the rationalization of the business operation. And, in this sense, monopoly and rationalization can proceed independently of each other.

Now I will go on to indicate the inter-relation between monopoly and rationalization. First, there are apparently many cases where entrepreneurs take advantage of rationalization as a means of attaining monopoly of their products. The cases are, as I have mentioned before, pointed out in particular by Marxian theory. It is expressed by the name, Monopolistic Capitalism. Marshall seems to hold that the law of increasing return leads to monopoly[1]. This means that rationalization is corelated to monopoly[2]. At any rate, rationalization which aims at the lowering of costs can strengthen the competitive power of business, and eventually might cause the defeated competitor to close his business so as to ultimately bring about the monopolized situation of the rationalized establishment. Second, rationalization accompanies, generally speaking, the mechanization of plants, and consequently the mass production of commodities. In this sense, rationalization can be said to be dependent upon the mass distribution of products. The management, therefore, plans to sell all the products, the amount of which it determines at the point of production-optimization, that is, at the minimum average cost of production. With regard to marketing, two things are generally taken into consideration,—the selling price and advertising with sales-service.

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[1] Marshall, A., Principles of Economics, pp. 238-239.

[2] Cf. Schmalienbach, E., Die Betriebswirtschaftslehre an der Schwelle der Wirtschaftsverfassung, *Zeitschrift für Handelswissenschaftliche Forschung*, 1928, S. 245.

When, while the amount of products is fixed from the point-view of cost, their demand does not match their supply, the management might be inclined to lower their prices. It will lead to price-cutting of the same or associated commodities, and to severe competition among producers. Therefore, in developed countries, there appears a tendency that producers endeavor to avoid competition through price as far as possible. They prefer to stimulate demand by way of advertising and other marketing facilities. Another way is left to the management in order to secure the selling of all the amount of commodities produced. This is monopoly on the side of the producers. In other words, the merit of rationalization is thought not to be attained but for monopoly. The monopoly by means of patenting new commodities or improved manufacturing processes can be said to be an example of the above case. The consolidation of firms is another instance, if it realizes rationalization and monopoly at the same time.

The relation between rationalization and monopoly is not simple, and there are indeed several cases in which rationalization in the establishment depends upon the monopolization of products at their market, while monopoly at the market is facilitated or stimulated by rationalization. However, rationalization and monopoly are of quite a different nature. Their concepts are not the same ; and actually firms often aim at realizing either of these arrangements, independently of each other. At least we can observe as follows : the Marxian statement that rationalization is always or mostly planned as a means of realizing monopoly does not suit the actual business situation.

A SUGGESTION FOR REVIVAL OF WAGE FUND THEORY

Shozo Sobajima

I

It is no more than a common-sense view that wages as prices of labor are determined by the interaction of supply and demand on the labor market, and yet the truth of this common sense seems to have often been ignored by most economists. The most important reason for such feigned ignorance is that the Marginal Productivity Theory, as an economic principle of price formation with regard to the factors of production, has for long enjoyed authoritative popularity among so-called modern economists. In these days, however, people in increasing numbers are verifying their opinions that the marginal productivity theory is not a proper theory of wage settlement, for it is substantially nothing but an explanation of the demand for labor.

In this paper I intend to confirm for myself this right change of opinion about the character of the marginal productivity theory and to revive the old-fashioned Wage Fund Theory, or at least its justifiable kernel, which I think is helpful to make up for the defect of the former.

II

Let us begin by summarizing the main points in the marginal productivity theory. Properly speaking, the theory aims to give a deductive analysis of the necessary equilibrium conditions of a labor market which is supposed to be "free" or "perfect". It is presumed from the outset that the supply of labor is a given datum and that all the laborers have equal and given efficiencies. These symplifying assumptions are entirely artificial, of course, but they are postulated, none the less, by the advocates of the theory, with a view to clarify the most important and fundamental forces in the settlement of wages on the market.

Now, the first condition necessary for the establishment of equilibrium on the labor market is that each and every laborer should receive the same wage. The second necessary condition consists in the fact that the wage equals the value of the marginal product of the laborers, and this fact is regarded as a natural consequence of the law of diminishing returns. Since in equilibrium the total demand should necessarily equal the total supply, the equilibrium rate of wage must be that which just enables the total number of laborers available to be employed, and which, in consequence, must equal the value of the marginal product of the laborers available. The marginal productivity theory summarized thus far is often expressed as the law of the "least cost" combination of the factors, or the condition of minimum cost of production per unit of output, that is to say, $\frac{\text{marginal product of labor}}{\text{rate of wage}}=\frac{\text{marginal product of capital}}{\text{rate of interest}}=$ ……. It is important to observe that the above-mentioned condition of the proportionality of marginal products does not always mean the state of full equilibrium in which the prices of the factors equal the value of the marginal products. Rather, in actual labor market where continual changes in the methods of production are going on, accompanied by ceaseless changes in the marginal productivity of labor, realization of the equality of wages and marginal products would be out of the question.

III

We have seen from the above recapitulation of the marginal productivity theory that it lays stress solely on the demand side in the labor market, assuming the supply of laborers given. How is it, then, that the theory, with the defect of making light of the supply side, has nevertheless been acknowledged for long as an appropriate wage theory? One reason near at hand is that it can give rough explanation of the different wage levels between different industries as well as between different regions. To give familiar examples, wages are generally higher in urban industries than in the rural agriculture, and the laborers at large are given higher wages in the United States of America than in Japan. The theory may likewise be able to render a rough account of the historical differentials of wages. After all, we may admit that it is not impossible for the marginal productivity theory to give an approximate outlook on the natural movements of wages which will keep step with the development of efficiencies of the laborers and, in conformity with this, to point out in a general way the maximum that wages can economically get to.

That the marginal productivity theory is, as suggested above, able to give rough indications as to wage differentials between industries and between regions and, also, as to the historical differentials of wage level, is not unrelated to the fact that it was advanced at the time when so-called free enterprise system was making rapid strides and, accordingly, an excess demand for labor was expected to last. As is well known, real wages were then going up rapidly with the advance of full-scale industrialization, while the birth-rate was on the decline with the spread of city life. In short, the historical and objective background which gave birth to the theory in question may be summarized as follows: rate of capital accumulation in excess of rate of population increase → increasing marginal productivity of labor → rising wages. Thus, it is no wonder that what is called an optimistic key-note of the theory, in contrast with a gloomy tone underlying the wage fund theory in the name of the "Iron Law of Wages", is thought to have resulted from its very origin.

It may be said in this connection that the optimistic key-note of the law of marginal productivity might be stressed to the utmost, when it is interpreted as the economic principle by which the relative shares of the factors of production are determined with precision. And moreover, in the capacity of such a principle it might be employed as an instrument to deny the so-called exploitation of labor or sweating system. However, it is now generally acknowledged that the theory of marginal productivity, being in itself an economic principle of the demand for the factors, has no voice in the matter of exact determination of their relative shares. At the utmost, it might be allowed to speak on the matter to some extent, having recourse to the concept of the elasticities of substitution of the factors.

IV

I have stated above just an outline of the circumstances which led up to a *de facto* recognition of the law of marginal productivity as wage theory, touching incidentally upon the error of making brag of it as the economic principle that is able to work out a satisfactory solution to the problem of distribution of national income. I must now proceed to the main issue and explain at some length why the marginal productivity theory is unable to be satisfactory as wage theory.

To begin with, it goes without saying that a perfect or free labor market is no more than a speculative hypothesis, so that a number of simplifying assumptions involved in it can in reality never be realized as they are expected in theory. On the contrary, imperfection of the market for lack of free competition, — such as the inertia of established social customs or the force of personal habits, influences of labor unions and all sorts of interventions of the government, to mention only a few remarkable instances, — cannot but spoil the abstract and formal pureness of the marginal productivity theory. If one wishes none the less to defend the formal validity of the theory, then he would most likely be compelled to say as follows: it is one thing that in reality wages are influenced markedly by all sorts of forces which a free labor market does not know, while it is another thing that the law of marginal productivity holds true in theory, so that there is in principle no contradiction between them. Or, one may, taking a step forward, demand the conception of a perfect market or free competition as an optimum state of the economic process, that is, as the so-called "competitive norm", regarding it as an indispensable instrument of theoretical analysis in the deductive method. In any case, as imperfect market of various kinds becomes increasingly the normal state of the actual markets, the marginal productivity theory could be supported only at the expense of making its substance more and more vacant. No wonder, therefore, that all sorts of monopolistic theory of wages are nowadays increasingly maintained and supported.

In this paper, however, I must be content with the mere suggestion of an importance of monopolistic theories of wages, for my chief object in view is, finding the clue to my statement in the unreal assumption of a free market, to make clear the true nature of the marginal productivity theory as wage theory. And what I have to say about its nature amounts to this. (1) Although the fundamental proposition of this theory, that in equilibrium the wage rate should equal the value of the marginal product of the laborers, may be allowed to apply, in the abstract, to every case of wage settlement in the labor market, its effective application would in fact be limited to the one case in which all the laborers are entirely powerless, or in other words, in which the supply of labor has no other meaning than the number of laborers in existence. And such a severe restriction of its application is nothing but a natural consequence of the presumption that the supply of laborers is a given datum in a free market. (2) It is true that, in the ordinary graphical explanations of wage settlement in a competitive labor market, the supply curve is drawn so as to imply that either disutility of labor or sacrifice of leisure plays an active part in fixing an equilibrium rate of wage, and also that those laborers who rate the disutility of labor higher than the equilibrium wage are obliged to remain unemployed. But the supply curve in this sense does not tell us the true nature of the resistance of laborers. And what is more, the supply of labor is, so to speak, merely the reverse side of the demand for labor, so long as we adhere to the standpoint of the marginal productivity theory, that is, in so for as we do not take a compromising attitude. (3) In this connection we must call to mind the fact that this theory has its genesis in the marginal utility theory. To say more precisely, it was advanced as an application of the subjective theory of "imputation", which tells us that the value of the factors of production is necessarily derived from that of the finished consumption goods, to the problem of price formation of the factors themselves. No wonder, therefore, that the marginal productivity theory is lacking in the supply function with an independent meaning of its own and, thus, cannot be a sufficient wage theory. By the way, it may be mentioned that this neglect of an independent supply function has something to do with the usual way of thinking of modern economists who, looking upon the supply of labor as a demographic problem, remove it outside the theory of wage.

V

What are, then, the independent factors which have an influence upon the supply of labor and which are thus indispensable to supplement the weak point of the marginal productivity theory? The most important among others is, in my judgment, the standard of living of the laborers. Though I do not deny that various forms of monopolistic theory of wages may have their own respective merits, yet I feel confident that the factor which has the most immediate and at the same time the most general influence upon the supply of labor is the standard of living of the laborers and that, moreover, this important factor is hard to be dealt with exhaustively by pure economic theories of monopoly. And it is this very factor and none other which induces me to attempt, as far as I can, to bring to life again the old-fashioned Wage Fund Theory, or to be more exact, a clever idea involved in it.

Well, a clue to the revival of this old theory is to be found, if we put a proper interpretation on it as a long-range observation of the movement of wages. To be sure, the wage fund theory in its rigid formulation given by J. S. Mill may turn out to be nothing but a sort of truism. Moreover, various forms of the theory are said to be to blame for their assumption of the fixed amount of wage fund, that is, for their neglect of the fact that changes either in the demand for products or in the methods of production are inevitably attended with changes in the amount of wage fund. However, such a blame does not apply with effect to the proper interpretation of wage fund theory of classical economists, whose principal object of studying political economy was to find out, from the long-run point of view, the natural laws which direct the distribution of national income. Let us refer to the argument of David Ricardo as a typical classicist.

Ricardo's economic discussion centers about the natural laws which regulate the distribution of social product among the three classes, namely, the landed class, the capitalist class and the working class, and his inquiry into these laws of distribution centers round the wage theory.

On the one side, the ground rent in his reasoning or the differential rent is regarded as an effect and not a cause of the price formation of the products. And on the other side, captial is deprived of its independent function as factor of production, in compliance with his assumption that the amounts of capital invested are everywhere in proportion to the quantities of labor employed. Thus, it is natural that in Ricardo's way of thinking the prices of all the products should be determined exactly in proportion to the quantities of productive labor. And it follows from this that the wage theory should occupy a pivotal position in his system of economics. After this brief comment, I have now to touch upon the gist of his wage theory.

The "market price" of labor would, at any time, be determined by the interaction of supply and demand on the labor market. In other words, the actual wages the laborers receive would always be decided as the ratios of the amount of wage fund to the number of working people, that is to say, $\frac{\text{wage fund}}{\text{working population}} =$ average level of wage. And both the numerator and the denominator might be taken for the given quantities in each occasion. On the other hand, however, the "natural price" of labor would, from the long-run point of view, show the secular trend to stick to the minimum cost of living or the so-called "subsistence level" of the laborers. To put it in another way, real wage levels would tend to fall gradually with the natural progress of society, that is, with the increase of both capital and population and, thus, tend to be tied up to the historical and conventional levels of minimum subsistence, which are just sufficient to perpetuate the then existing working population.

Now, I think it is not difficult to see, without giving full particulars of the wage fund theory, that so long as it is properly taken for a long-run observation of wage movement, it is no more to blame for the assumption of the fixed amount of wage fund. Suffice it to say that what is called the "Ricardo's effect" proves its true worth in connection with his "dynamic" economic researches. But the wage fund theory which is thus regarded with reason as a long-run theory of wages may, at the same time, be united with, or rather transformed into, what is called the Cost of Production Theory of wages, which is upheld also in the name of Ricardo. And with this qualification, the theory is again open to criticism. It is maintained, namely, that the so-called historical and conventional subsistence level of the laborers is in itself not a factor of economic nature and that such a non-economic factor ought not to be introduced into economic analysis. In this respect, however, I must hold a different view.

Even in the advanced industrial nations of today, wages have, as a matter of fact, historical inertia as well as conventional structure, in the same way as wages in the eighteenth century had both inertia and structure. The significant understanding in this connection is that both inertia and structure of wages are essentially the reflections of the standard of living of the laborers, and that the standard of their living depends, first of all, upon the social standing and power which they take possession of. And if, as I believe, the standard of living does thus defy pure economic explanation, then what is called an economic and deductive theory of wages should more or less reflect on the non-economic circumstances, lest it should be at variance with reality. With this understanding, I should like to insist that the Cost of Production Theory of wages which allows for the necessary social and conventional conditions is quite right in its way of looking at the matter. I think it is nothing but an ideological reflection of the fact that the social position of the laborers was then extreemly low and for that very reason wages could not but show a lasting tendency to stick to their subsistence level. (It may be said in passing that the so-called "cost-inflation" in these days is due, before everything else, to the fact that the social standing of the laborers has of late been raised remarkably, with the natural result that the standard of their living has also been raised remarkably).

It is of use to recall in this connection why J. S. Mill, who had once advocated the wage fund theory in its strictest and, at the same time, almost tautological form, was compelled to abandon it at last. He is said to have pried into the gloomy implication of this theory which might in fact turn out, in all probability, to be the iron law of wages. Taking account of this probability, he came to stick to the opinion that the laborers are able, by means of trade unions, to raise the average wage level and also to increase their relative shares. In other words, he arrived at the conclusion that an increasingly large number of laborers might have a natural effect to push down the wages in the free labor market, but their social powers would, none the less, be quite effective to force up the actual wages.

VI

I want to say in conclusion that the right kernel of the Wage Fund Theory ought to be restored to life again, in order to make up for the defect of the Marginal Productivity Theory. The latter tells us that the demand for labor is influenced, among other things, by an estimate of the productivity of laborers and the ability of employers to pay, while the former makes us give due attention to the undeniable fact that the supply price offered by laborers depends upon the standard of their living and the standard of living depends, above all, upon their social standing and power.

AN ANALYTICAL STUDY OF THE ENTERPRISE GROWTH

KAORU TAKADA

As in political economy where the theory of growth has been playing a big role, so also in business economics the growth theory must be one of the groundworks. In reality, the growth of a national economy depends upon and is consisted of the growth of individual enterprises which are in the national economy. The growth analysis of enterprise, therefore, will contribute not only to business management itself, but also to the political economy. I will try to develop in this treatise some basic models of growth-analysis of enterprise.

1) Selection of Basic Volumes

The growth-analysis of enterprise of which I try to develop the principles depends upon the "value-added", or "added value". In our country, the value-added-analysis has already been utilized in determining the most valuable industries which should be invited to locate in newly industrializing area. But, in business administration itself, the profit-analysis has exclusively been utilized. I have no intention to deny the profit-analysis, because our economy is bases upon the recognition of free profit seeking. The profit-analysis may be of high value to the stock-holders. But, it should be noted that the profit has its basis in value-added and from the standpoint of going concern itself the value-added should be recognized as the fundamental valume from which the profit and the wage and salary can be distributed. The value-added, therefore, is the most proper volume for the growth-analysis of enterprise as a whole and as a going concern. The profit-analysis should be regarded as a constituent part of value-added-analysis.

Concerning the wage and salary analysis which is of highest value for the standpoint of the labor and the union, the above mentioned relation holds true. Because the wage and salary, in the long run, can exist only when the value-added of the enterprise exists.

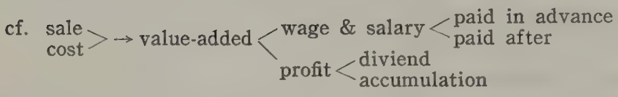
The value-added of enterprise can be defined as the balance (saldo) between sales and cost (Fig. 1). And this balance contains the profit and wage and salary. The fact that the wage and salary are used to be paid in advance before the calculative conclusion at the end of the fiscal year does not deny the essential character of the wage and salary as the constituent part of the value-added.

cf. sale − cost = value added
= profit + wage & salary

P/L/S

Cost material, depreciation, rent for debt etc.	Sale
Value-added profit wage & salary	

Fig. 1



2) Absolute and Relative Value

a) Absolute Value-Added

The growth of enterprise can, without doubt, be judged by the tendency of successive absolute values-added defined at the end of respective fiscal year. But, this method fails to clarify the true whole situation of the enterprise, because in this method the causes (sale and cost) of the effect (value-added) are not brought to light.

b) Individual Relative Value-Added

The growth of enterprise can be judged by the tendency of successive values-added defined per head of laborers or per unit of the capital. This method depends upon the relative value (value-added/heads or v.a./capital), but this method is rough and primitive in spite of the ease of understanding, because the value-added would not be distributed exclusively to the labor or to the capital and each of these two ratio-values contains the share which belongs to the opposite factor.

c) Total Relative Value-Added

The value-added can be related to other values, namely total sale and total cost of the enterprise.

total sale − total cost = total value-added
(S) (C) (A)

$S-C=A,$ $S=A+C$

$P/L/S$

C	S
A	

These three kinds of values can be related to each other and those relations which are significant to our analysis are as follows:

$$\begin{tikzcd} & A \arrow[dl, "(\alpha)"'] \arrow[dr, "(\beta)"] & \\ S \arrow[rr, "(\gamma)"'] & & C \end{tikzcd}$$

$$(\alpha)\quad R_1=\frac{A}{S}=\frac{S-C}{S}=1-\frac{C}{S}$$

$$(\beta)\quad R_2=\frac{A}{C}=\frac{S-C}{C}=\frac{S}{C}-1$$

$$(\gamma)\quad R_3=\frac{S}{C}=\frac{A+C}{C}=\frac{A}{C}+1$$

All of these three *Rs* can be named as value-added-coefficients and one can select any of these. In this treaties I will use R_2.

3) Determination of Tendency of *Rs*

The outset procedure is to determine the tendency of relative total values-added (*Rs*). In almost all the cases, *Rs* plotted in two dimensional co-ordinate trace zigzag course as $A \to B \to C \to \cdots$ in Fig. 2. It is desirable to determine the representative trend line through these *Rs*. This trend line can roughly be divided into two kinds, linear and concave.

a) Linear Course

When by observation the plotted R-points can be regarded to trace the linear course, a straight line which is determined by $y=mx+b$ might be inserted. The most commonly used method is the "least square method". Its calculation is done by the following set of equations:

$$\left.\begin{array}{l} \sum x^2\cdot m+\sum x\cdot b = \sum xy \\ \sum x\cdot m+\ nb \quad = \sum y \end{array}\right\}$$

cf. y=hights of *Rs*
x=number of fiscal years
m=slope of the trend line
b=hight of y when $x=0$
n=number of *Rs*

By inserting the values of m and b which can be calculated by the above equations into $y=mx+b$, the trend line can be got.

b) Concave Course

When by observation the plotted R-points can be regarded to trace a concave course, a curve which is defined by $y=lx^2+mx+b$ is inserted. This calculation is done by the following set of equations:

$$\begin{aligned}
\sum x^4\cdot l+\sum x^3\cdot m+\sum x^2\cdot b &= \sum x^2y\\
\sum x^3\cdot l+\sum x^2\cdot m+\sum x\cdot b &= \sum xy\\
\sum x^2\cdot l+\sum x\cdot m+\ n\cdot b &= \sum y
\end{aligned}$$

When l, m, b are determined, these values are inserted into $y=lx^2+mx+b$ which signifies the concrete concave line.

4) Growth-rate of Enterprise

The rate of growth of enterprise is here defined as the rate of the development of *Rs*.

We have defined in the above mentioned (3) the tendency of *Rs* which shows the long term growth rate. Besides the long term growth rate, there are short term (=one fiscal year) or unit term growth rates, and these are of great value in evaluating the individual fiscal year growth in the broad and general situation and this would cause the manager to try to detect the causes of under-average or above-average development during each fiscal year.

cf. In Fig. 2, the slope between *A* and *B* is smaller than the slope of *T* (trend line). $\tan\alpha<\tan\beta$
The slope between *B* and *C* is larger than that of *T*. $\tan a>\tan b$

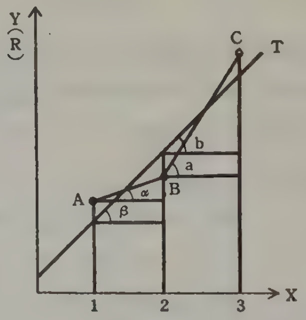


Fig. 2

In this treatise I do treat the long term growth rate itself.

5) Types of Growth of Enterprise

By the above mentioned long term trend line which shows the long term growth rate, we can judge the growth situation of enterprise. And we know that there are 7 basic types of growth. In this case, we understand this "growth" not only in upwards (plus, positive) but also in downwards (minus, negative). It is important for the manager to understand to which type the enterprise is submitted in its development.

a) Basic Types of Growth (Fig. 3)

Seven basic types of growth are as follows:

(i) upper increasing type
(ii) upper proportional type
(iii) upper decreasing type
(iv) constant type
(v) lower decreasing type
(vi) lower proportional type
(vii) lower increasing type

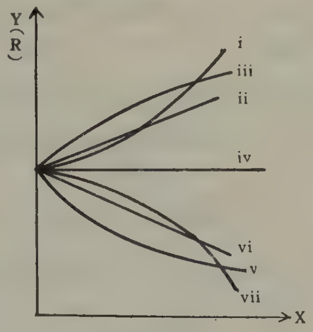


Fig. 3

In this case, "upper" or "lower" means the regions where the marginal rate of growth is plus or minus respectively.

In the following, I will try to clarify the characteristics of each type.

(i) upper increasing type

When the representative trend line through the various *Rs* shows upwards concave shape and $\frac{dy}{dx}>0$ everywhere, this type is named as upper increasing. The characteristic of this type is that the margical rate of growth $\left(\frac{dy}{dx}\right)$ successively increases. When we set $dx=1$ fiscal year, the enterprise which follows this type has the growth rate of a certain fiscal year larger than that of the previous fiscal year (Fig. 4).

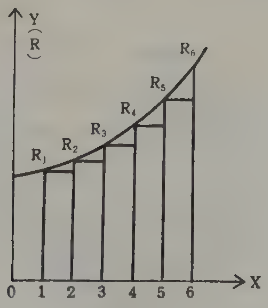


Fig. 4

$$\frac{R_2-R_1}{2-1}<\frac{R_3-R_2}{3-2}$$

or

$$\frac{R_n-R_{n-1}}{n-(n-1)}<\frac{R_{n+1}-R_n}{(n+1)-n}$$

It is no doubt that these situation can be attained only by extraordinarily flourishing economic situation or by very lucky enterprise.

Because here we always presuppose that the absolute value-added does not diminish in the course of the long term.

This type of growth requires the relation between sale (S) and cost (C) as follows:

We define: Value-aded $(A)=S-C$

Relative total value-added $(R)=\dfrac{A}{C}$

$$=\frac{S-C}{C}=\frac{S}{C}-1$$

At the n and $n-1$ (ordinal) fiscal year,

$$R_n=\frac{S_n}{C_n}-1 \cdots\cdots (1) \qquad R_{n-1}=\frac{S_{n-1}}{C_{n-1}}-1 \cdots\cdots (2)$$

In order to be $R_n>R_{n-1}$, the following relation must exist.

$$\frac{S_n}{C_n}-1>\frac{S_{n-1}}{C_{n-1}}-1 \qquad \therefore \frac{S_n}{C_n}>\frac{S_{n-1}}{C_{n-1}}$$

$$\therefore \frac{S_n}{S_{n-1}}>\frac{C_n}{C_{n-1}} \qquad \therefore \begin{pmatrix} S_{n-1}>0 \\ C_n \;\; >0 \end{pmatrix}$$

We know from the above mentioned that in this type the growth rate of sale must be larger that the growth rate of cost between the two adjacent fiscal years everywhere in the course.

Furthermore, the following relation most exist.

From $R_n-R_{n-1}<R_{n+1}-R_n$, we ge $\dfrac{2S_n}{C_n}<\dfrac{S_{n+1}}{C_{n+1}}+\dfrac{S_{n-1}}{C_{n-1}}$.

$$R_n=\frac{S_n}{C_n}-1, \quad R_{n-1}=\frac{S_{n-1}}{C_{n-1}}-1, \quad R_{n+1}=\frac{S_{n+1}}{C_{n+1}}-1$$

Hypothetic example of this type is as follows:

fiscal year	S	C	A	$R=\frac{A}{C}=\frac{S}{C}-1$	$y'\left(=\frac{dy}{dx}\right)$ $(dx=1)$
1	10	8	2	$\frac{2}{8}=\frac{10}{8}-1=0.25$	
2	22	16	6	$\frac{6}{16}=\frac{22}{16}-1=0.37$	0.12
3	49	32	17	$\frac{17}{32}=\frac{49}{32}-1=0.53$	0.16
4	110	64	46	$\frac{46}{64}=\frac{110}{64}-1=0.71$	0.10
5	246	128	118	$\frac{118}{128}=\frac{246}{128}-1=0.92$	0.21

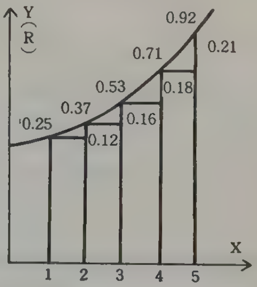


Fig. 5

(ii) upper proportional type

When the representative trend line through the various *Rs* shows upwards linear shape, this type is named upper proportional. The characteristic of this type is that the marginal rate of growth is everywhere positive and constant. When we set $dx=1$ fiscal year, the enterprise which follows this type has the growth-rate of a certain fiscal year equal to that of the previous fiscal year.

The requirements of this type in the relation between sale and cost are as follows:

$$R_n > R_{n-1}, \quad \frac{S_n}{S_{n-1}} > \frac{C_n}{C_{n-1}} \qquad \text{cf. (i)}$$

$$R_n - R_{n-1} = R_{n+1} - R_n, \quad \frac{2S_n}{C_n} = \frac{S_{n+1}}{C_{n+1}} + \frac{S_{n-1}}{C_{n-1}}$$

Hypothetic example is as follows:

fiscal year	S	C	A	$R=\frac{A}{C}=\frac{S}{C}-1$	y'
1	10	8	2	0.025	
2	22	16	6	0.375	$>$ 0.125
3	48	32	16	0.500	$>$ 0.125
4	104	64	40	0.625	$>$ 0.125
5	224	128	96	0.750	$>$ 0.125

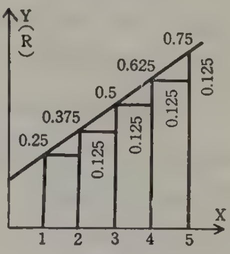


Fig. 6

(iii) upper decreasing type

When the represetative trend line through the various *Rs* shows downwards concave shape and $\frac{dy}{dx}>0$ everywhere, this type is named as upper decreasing.

(a) characteristic:

Marginal rate of growth successively decreases. Growth-rate of a certain fiscal year is smaller than that of the previous year (Fig. 7).

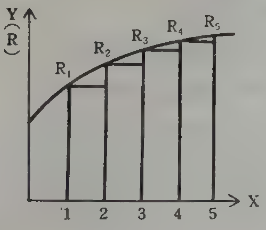


Fig. 7

$$\frac{R_2-R_1}{2-1} > \frac{R_3-R_2}{3-2}$$

or

$$\frac{R_n-R_{n-1}}{n-(n-1)} > \frac{R_{n+1}-R_n}{(n+1)-n}$$

(b) requirements :

(1) $$R_n > R_{n-1}, \quad \frac{S_n}{S_{n-1}} > \frac{C_n}{C_{n-1}}$$

(2) $$R_n - R_{n-1} > R_{n+1} - R_n, \quad \frac{2S_n}{C_n} > \frac{S_{n-1}}{C_{n+1}} + \frac{S_{n-1}}{C_{n-1}}$$

(c) hypothetic example :

fiscal year	S	C	A	R	y'
1	10	8	2	0.25	
2	22	16	6	0.37	> 0.12
3	46	32	14	0.43	> 0.06
4	95	64	31	0.48	> 0.05
5	195	128	67	0.52	> 0.04

(iv) constant type

When the representative trend line through *Rs* shows horizontal linear shape (parallel to x axis), this is named constant type.

(a) characteristic :

Marginal rate of growth is equal to zero.

(b) requirements :

(1) $$R_n = R_{n-1}, \quad \frac{S_n}{S_{n-1}} = \frac{C_n}{C_{n-1}}$$

(2) $$R_n - R_{n-1} = R_{n+1} - R_n, \quad \frac{2S_n}{C_n} = \frac{S_{n+1}}{C_{n+1}} + \frac{S_{n-1}}{C_{n-1}}$$

especially in this type

$$R_n - R_{n-1} = R_{n+1} - R_n = 0, \quad \therefore \frac{S_{n-1}}{C_{n-1}} = \frac{S_n}{C_n} = \frac{S_{n+1}}{C_{n+1}}$$

The growth-rate of sale must equal to that of cost. It is obvious that this apparently easy and simple requirement is in reality not so easy for the big enterprise to fullfil. In general, upper types and constant type is rather easy to achieve for the smaller enterprises in its expanding phase, but very difficult for the bigger enterprise to achieve, because the bigger the base volumes S and C becomes, the larger the volumes which are required to maintain the Rate $A/C = \frac{S}{C} - 1$ equal or larger.

(c) hypothetic example:

fiscal year	S	C	A	R	y'
1	10	8	2	0.25	> 0
2	20	16	4	0.25	> 0
3	40	32	8	0.25	> 0
4	80	64	16	0.25	> 0
5	160	128	32	0.25	

(v) lower decreasing type

When the representative trend line through *Rs* shows upwards concave shape and $\frac{dy}{dx}<0$ everywhere, this is named lower decreasing type.

(a) characteristic:

Marginal rate of growth successively decreases in the absolute values. Growth-rate of a certain fiscal year is smaller than that of the previous fiscal year and that

$$\frac{R_1-R_2}{2-1}>\frac{R_2-R_3}{3-2},$$

$$\frac{R_{n-1}-R_n}{n-(n-1)}>\frac{R_n-R_{n+1}}{(n+1)-n}.$$

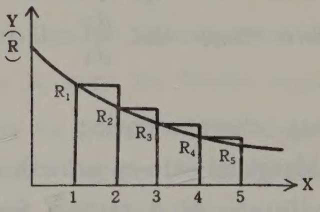


Fig. 8

(b) requirements:

(1) $R_n<R_{n-1}, \quad \frac{S_n}{S_{n-1}}<\frac{C_n}{C_{n-1}}$

The growth-rate of sale is smaller than that of cost.

(2) $R_{n-1}-R_n>R_n-R_{n+1}, \quad \frac{2S_n}{C_n}<\frac{S_{n-1}}{C_{n-1}}+\frac{S_{n+1}}{C_{n+1}}$

(c) hypothetic example:

fiscal year	S	C	A	R	y'
1	1,000	600	400	0.66	> −0.06
2	1,120	700	420	0.60	> −0.03
3	1,211	771	440	0.57	

(vi) lower proportional type

When the representative trend line through *Rs* shows downwards linear shape, this is named as lower proportional type.

(a) characteristic :

The marginal rate of growth is negative and constant. Growth-rate of a certain fiscal year is equal to that of that of the previous fiscal year.

(b) requirements :

(1) $R_n < R_{n-1}$, $\dfrac{S_n}{S_{n-1}} < \dfrac{C_n}{C_{n-1}}$

(2) $R_{n-1} - R_n = R_n - R_{n+1}$, $\dfrac{2S_n}{C_n} = \dfrac{S_{n-1}}{C_{n-1}} + \dfrac{S_{n+1}}{C_{n+1}}$

(c) hypothetic example :

fiscal year	*S*	*C*	*A*	*R*	*y′*
1	1,000	600	400	0.66	−0.06
2	1,120	700	420	0.60	−0.06
3	1,254	814	440	0.54	

(vii) lower increasing type

When the representative trend line through *Rs* shows downwards concave shape and $\dfrac{dy}{dx} < 0$ everywhere, this is named lower increasing type.

(a) characteristic :

Marginal rate of growth succeedingly increase in the absolute values. Growth-rate of a certain fiscal year is larger than that of the previous fiscal year.

$$\frac{R_1 - R_2}{2-1} < \frac{R_2 - R_3}{3-2},$$

$$\frac{R_{n-1} - R_n}{n-(n-1)} < \frac{R_n - R_{n+1}}{(n-1)-n}$$

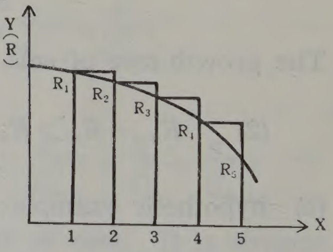


Fig. 9

(b) requirements :

(1) $R_n < R_{n-1}$, $\dfrac{S_n}{S_{n-1}} < \dfrac{C_n}{C_{n-1}}$

(2) $R_{n-1} - R_n < R_n - R_{n+1}$, $\dfrac{2S_n}{C_n} > \dfrac{S_{n-1}}{C_{n-1}} + \dfrac{S_{n-1}}{C_{n-1}}$

fiscal year	*S*	*C*	*A*	*R*	*y′*
1	1,000	600	400	0.66	−0.06
2	1,120	700	420	0.60	−0.07
3	1,270	830	440	0.53	

6) Rank of 7 Growth Types

Which of the 7 types is most desirable? No doubt, the upper increasing type (i) is most desirable. Most undesirable type is the lower increasing type (vii). Between these two extreme types, other 5 types are ranked as follows:

Rank of Growth Types

Basic Types of Growth	Rank	
	ordinal	points
(i) upper increasing	1	10
(ii) upper proportional	2	9
(iii) upper decreasing	3	8
(iv) constant	4	7
(v) lower decreasing	5	6
(vi) lower proportional	6	5
(vii) lower increasing	7	4

As stated above, our models are based upon the relative total value-added $\left(R=\frac{A}{C}\right)$, and so in the real analysis it may be found that the upper types, especially (i), would only rerely be actual. The bigger an enterprise becomes, the more difficult it would become to maintain the same upwards rate of growth. It is, therefore, probable that at first ten fiscal years, for example, an enterprise traces the type (i) and then in the next ten fiscal years traces (ii) or other. Thus, in the longer course of growth, the same enterprise might trace various types. These combinated types would at most be 7^2 when 2 types are followed (the same type can follow), 7^3 when 3 types followed, and so on. And the selection of basic long-term may be made voluntarily by each enterprise in accordance to the peculiar circumstances of the enterprise.

If, for the brevity of procedure, translate concave type into linear type, the longer course of growth might be represented by vector addition. For example, when an enterprise follows various types such as (i) → (ii) → (iii) → (iv), we may judge roughly as follows: (Fig. 10)

We roughly judge so that this enterprise, in the course of the four long-terms, has grown with the growth-rate which the slop of **L** indicates. No doubt, the more exact and finer method would be to insert a straight

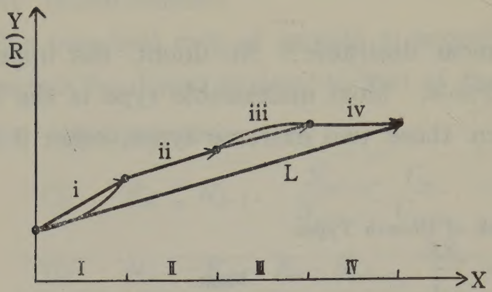


Fig. 10

Vector (i)+(ii)+(iii)+(iv)
=L

line or a curve through the methods mentioned already at (3).

It is no doubt that there are, as mentioned above (2), many indexes which can show the growth phase of enterprise, and our method is the most severe of all the possible indexes. Our method may often do not match with common sense, but still has a high value. At least, even if an other method might be used, the above-mentioned 7 types of growth would be still utilized to bring out much good effect.

The relation between the individual relative value-added [(2), (b)] and the total relative value-added should be analysized to clarify the whole inner situation of the growth of an enterprise. This analysis will be done in another treatise.